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GUIDELINES FOR THE MANAGEMENT OF ACUTE BLUNT HEAD TRAUMA IN ALASKA

BACKGROUND

These guidelines are the efforts of representatives of the Alaska medical community to recommend a reasonable evidenced-based approach to head injured patients in our state. This includes regions that do not have access to neurosurgical specialty care or may not have computerized tomography (CT) imaging readily available. These recommendations are based on our reading of the current medical literature and the experience of clinicians from around the state. This is a multi-disciplinary consensus of local providers and specialists actively caring for head injured patients in Alaska. These guidelines are not meant to replace clinical judgment, but to offer a reasonable approach to these patients.

Blunt head injury is a frequent injury in Alaska. The Alaska State Trauma Registry from 2011 – 2015 records 1,873 isolated blunt head injuries admitted to Alaskan hospitals. This translates to over one admission each day for isolated blunt head injuries. It is estimated an even larger number of patients are evaluated in clinics and emergency departments (ED) and discharged home, as the registry only captures patients who are admitted or transferred. Of the 1,873 isolated blunt head injuries, 1,397 (74.6%) were considered mild with a Glasgow Coma Scale (GCS) of 14 or 15. The remainder 10.2% (191) were moderate, defined as GCS 9-13, and 15.2% (285) severe, defined as GCS 3-8.

Neurosurgical specialty care is a geographically scarce resource in the state of Alaska. The only city with 24-hour availability is Anchorage. Patients who need neurosurgical care require transfer to either Anchorage or Seattle, Washington. During the four year period reviewed, 51.6% (966) of patients with isolated blunt head injuries had their initial care in or were transferred to Anchorage or Seattle. The remainder (48.4%; 907 patients) were kept at a facility without neurosurgical specialty care.

A review of patients in rural Alaska with blunt head trauma shows that transfer rates remain high despite previous Alaska Head Injury guidelines published in 2003. Secondary over triage is defined as the interfacility transfer of patients who are rapidly discharged home without surgical intervention by the receiving institution. It is associated with increased costs of care and excessive demands on higher level trauma centers. A nationwide study looked at over 99,000 trauma patients who were discharged home with forty-eight hours and received no surgical intervention. Patients who were transferred to Level I trauma centers were comparable to patients kept at Level 3 and 4 centers. Head and neck injuries were the highest cause of secondary over triage and the concern for excluding a potentially devastating neurologic injury seemed to drive secondary overtriage.[1]

The Alaska State Trauma Registry was reviewed from 2011 – 2015 and identified 600 patients with CT reports and clinical signs of blunt head trauma initially seen in rural facilities.

Forty-four percent of patients with GCS 14 or 15 were transferred to centers with neurosurgical specialty care, including patients with both normal and abnormal CT scan findings. In the moderate head injury group, GCS 9-13, 66% were transferred and for patients with GCS 3-8, 70% were transferred. There were 260 patients with mild head injury, GCS 14 or 15, who were kept at rural non-neurosurgical facilities. Late transfer rates for this group were 11.9% with abnormal CT findings and 2.6% for patients with normal CT findings. There were no deaths in this group of 260 patients initially admitted to non-neurosurgical facilities.

Patient transport throughout Alaska is complicated by many factors, geography foremost. Alaska has three distinct regions when considering patient transport. The first, Southcentral region is composed primarily of towns connected to Anchorage by the road system, including the Kenai Peninsula, Matanuska Valley and continuing north to Fairbanks. The second the Southeast region, is comprised of many island and coastal communities that have transportation and referral ties to both Anchorage and Seattle. The third is the remote 'bush' areas of Alaska, villages not on the road system and often great distances from referral medical centers. Many times, transporting patients to definitive neurosurgical care requires aeromedical evacuation. Air ambulance systems are a limited resource within the state and inefficient use reduces their availability for other patients with time critical emergencies. In addition, because of weather, terrain, and the vast distances involved, flying in Alaska is inherently more dangerous for flight crews and patients. The National Institutes of Occupational Safety and Health (NIOSH) reported that commercial pilots flying on commuter airlines or charters in Alaska have a mortality rate five times that of pilots in the rest of the United States.[2] Although the safety of aeromedical evacuation services have improved over time, the risk to patients and flight crews remains an important factor in deciding to transfer patients. Regarding fatalities specific to aeromedical evacuation, the NIOSH database was queried from 1990 – 2016 and found two aeromedical transport fatality incidents in Alaska, which together resulted in the death of five crew members and 2 patients. The monetary cost of aeromedical transportation varies greatly across the state with fixed wing transportation costs to Anchorage ranging from approximately $19,000 from the Mat-Su Valley to $82,000 from Barrow. Transport costs to Seattle are even higher, averaging approximately $160,000 per transport. Aeromedical evacuation in the Southeast region while still expensive has similar or somewhat reduced costs when patients are transported directly either to Seattle or Anchorage. These risks and costs must be weighed when considering patient transport across Alaska.

The management of blunt head injuries has been addressed in other regions that share similar challenges of rural transport and scarce specialty resources.[3] One of the emerging technologies to help rural and remote areas gain access to specialty care is teleradiology. Several studies have shown that head injured patients can be managed using teleradiology with neurosurgeon review. Telehealth consultations reduce patient transfers with subsequent low rates of late transfer due to either clinical or radiological deterioration.[4-6] This is relevant as over the last decade, many Alaskan hospitals have now acquired CT scanners. Most patients are able to undergo radiological and clinical evaluation at outlying regional hospitals. These guidelines seek

to address the question of which patients can safely be kept locally for medical observation with the help of telehealth neurosurgical consultation.

METHODS

In February 2017 the Alaska Trauma Systems Review Committee convened an ad hoc group to develop consensus recommendations for the evaluation of the acute head injured patients, focusing on considerations of care in areas without neurosurgical specialty care. The group consisted of 17 healthcare providers with representatives of emergency medicine, trauma surgery, neurosurgery, radiology, rural family medicine, intensive care, and pre-hospital care present. Prior to the meeting, a literature review was performed by two committee members and pertinent articles were distributed to the full committee. In addition, previous Alaska State Guidelines, developed in 2003were reviewed. These new guidelines represent the consensus of the committee.

SPECIAL CONSIDERATIONS

Alcohol and drug use:

Healthcare providers should be aware that heavy alcohol and drug use will severely limit the utility of the Glasgow Coma Scale as a triage tool in patients with suspected head injury.[7] Patients who have signs or measured values of alcohol or drug intoxication must be evaluated for signs of head trauma, such as ecchymosis or scalp lacerations. Signs of trauma combined with impaired GCS may prompt clinicians to obtain CT imaging sooner. If no signs of trauma, but impaired GCS $\leq$13, patients should be monitored by a healthcare provider with observation at regular intervals per provider discretion. If any clinical deterioration, a head CT scan should be obtained or the patient should be transferred for CT imaging. If there is no clinical improvement (return to GCS 15) within six hours or an interval consistent with local practice guidelines, a head CT scan should be obtained or the patient should be transferred for CT imaging.

Small children and infants:

Evaluation of head trauma in infants and small children also presents challenges. The purpose of these guidelines is to recommend clinical practice for adults over 18y.o. Pediatric patients under 18 years old are covered by the Alaska Pediatric Head Injury Guidelines.

DEFINITIONS

Acute head injury:

Blunt traumatic brain injury (TBI) is a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head.[8] This includes falls that lead to head strike, including ground level. An acute injury is one that is evaluated within 24 hours of the traumatic event. These guidelines do not apply to strokes or hemorrhage not associated with trauma.

Additionally, these guidelines should apply for blunt head trauma and are not recommended for penetrating head trauma. These guidelines apply to isolated head injury and are not recommended for patients who have signs of multi-trauma injuries.

Facility with no CT imaging available:

Healthcare providers are available but there is no CT scanning capability on site. There may or may not be routine x-ray availability. There are no neurosurgeons on staff.

Facility with no neurosurgeon available:

Healthcare providers and CT scanning capability are present. There are no neurosurgeons on staff.

Glasgow coma scale:

The most commonly accepted assessment tool for documenting neurologic status of the head injured patient. (Figure 1)

Canadian CT imaging criteria:

Clinicians should perform non-contrast head CT scan on patients with suspected brain injury. Multiple clinical decision tools are available to aid clinician judgement regarding which patients at minimal risk for brain injury not requiring neuroimaging. Although there are several proposed criteria, this working group came to consensus to follow the Canadian CT Head Rule (Figure 2A). In addition, due to the closely related nature of head and neck injuries, all patients with blunt head trauma should be evaluated for the possible need of non-contrast cervical spine (c-spine) imaging. This working group came to consensus to follow the Canadian C-Spine Rule for imaging criteria (Figure 2B).

Clinical Observation:

Neurochecks performed by a health care provider, at least hourly for a minimum of six hours or at an interval deemed appropriate by the provider. The patient should remain at the facility for a health care provider to perform these checks. Clinical observation may be liberalized if the patient returns to GCS 14-15.

Risk factors:

Risk factors are clinical signs, symptoms or history that place the patient at higher risk for clinically significant intracranial injury regardless of GCS.

- **Age 65 or older –** Older patients with injuries have a small increased risk for significant injuries following minor head trauma when compared with younger adults.[9]

- **Clinical signs of skull fracture –** Clinical signs of a basilar skull fracture include periorbital ecchymosis (raccoon's eyes), retroauricular ecchymosis (Battle's sign), hemotympanum, or cerebrospinal fluid leak from the nose (rhinorrhea) or ear (otorrrhea).

- **Radiographic evidence of skull fracture**
  The presence of a linear vault fracture in conscious patients increases the likelihood of an intracranial hemorrhage by about 400 times.[10] It is important to recognize that the American College of Radiology appropriateness criteria do not support use of plain X-rays in head trauma except in the specific case of pediatric non-accidental trauma, and that because of its poor sensitivity plain X-ray cannot be used to rule out skull fracture. Similarly plain X-ray has limited role in the evaluation of intracranial injury. **However, in resource-limited settings plain film or ultrasound may demonstrate skull fractures and this finding can be classified as a significant risk factor for intracranial injury.**

- **Dangerous mechanism of injury**
  High velocity mechanisms may lead to higher force if head strike occurs and should be evaluated with a higher suspicion of intracranial hemorrhage. These include pedestrian struck, ejection from a motor vehicle crash (MVC), and falls from greater than 3 feet.

Abnormal CT findings not usually requiring transfer:

Several imaging abnormalities have been found to have minimal to no clinical significance or risk for deterioration in the setting of isolated blunt head trauma**.** [3, 11] These exceptions do not apply to patients who are on anti-coagulant or anti-platelet therapy.

- Closed non-depressed skull fracture
- Open non-depressed skull fracture
- Isolated pneumocephalus
- Solitary cerebral contusion < 10mm
- Multiple cerebral contusions < 5mm
- Subarachnoid hemorrhage < 5mm
- Subdural hemorrhage <5mm

Anti-coagulant and anti-platelet therapy:

Anti-coagulants include warfarin and novel oral anticoagulants (NOACs). Anti-platelet therapy includes clopidogrel and aspirin. For the purpose of evaluating head injured patients with risk factors, this working group came to consensus to define an increased risk factor due to anti-coagulants/anti-platelet therapy as patients who were using anti-coagulants and/or anti-platelet drug therapy, excluding aspirin therapy alone up to 325mg. Patients who are on anti-coagulants or anti-platelet therapy pre-injury have been found to be at increased risk of intracranial hemorrhage following blunt head trauma.[12-15]

RECOMMENDATIONS (See attached flowsheets)

Patients with normal GCS (15) without risk factors

Patients who have a normal GCS exam of 15 without risk factors are unlikely to require medical or surgical intervention for a traumatic brain injury.[16] Based on the Canadian CT Head Rule, these patients do not require CT imaging. They may be discharged with a competent observer. These guidelines recommend discharging the patient with a head injury patient education sheet (Figure 3).

Patients with GCS 15 with risk factors

We recommend that all of these patients undergo a head CT without contrast, and consideration of a non-contrast C-spine CT if clinically indicated. In facilities without CT imaging, available, this would require a transfer to a higher care facility.

If the head CT imaging is normal, they may be discharged with a competent observer. These guidelines recommend discharging the patient with a head injury patient education sheet (Figure 3).

If the head CT has "abnormal CT findings not usually requiring transfer" we recommend consideration of clinical observation locally. A patient may be discharged with a competent observer and head injury patient education sheet when GCS returns to 15. If there is clinical deterioration, defined as a GCS drop of two or more, or if there is not clinical improvement within twenty-three hours of clinical observation, the patient should undergo prompt repeat head CT and neurosurgical consult.

If the head CT imaging is abnormal, images should be sent via teleradiology for review by a neurosurgeon and neurosurgical consultation should be obtained. The patients may be considered for local admission or transfer based on neurosurgical recommendations.

Patients with GCS 14 without risk factors

Patients with a GCS of 14 without risk factors may undergo clinical observation. If the patient's mental status returns to normal (GCS 15) within two hours, these patients do not require CT imaging and may be discharged with a competent observer and a head injury patient education sheet (Figure 3). If however, the patient does not improve to a GCS of 15 within two hours of clinical observation, we recommend obtaining a head CT without contrast, and consideration of a non-contrast C-spine CT if clinically indicated. In facilities without CT imaging available, this would require a transfer to a higher care facility with spinal motion restriction.

If the head CT imaging is normal, or has abnormal CT findings not usually requiring transfer, we recommend consideration of clinical observation locally. A patient may be discharged with a competent observer and head injury patient education sheet when GCS returns to 15. If there is clinical deterioration, defined as a GCS drop of two or more, or if the patient does not return to GCS of 15 within twenty-three hours of clinical observation, the patient should undergo prompt repeat head CT.

If the head CT imaging is abnormal, images should be sent via teleradiology for review by a neurosurgeon and neurosurgical consultation should be obtained. These patients may be considered for local admission or transfer based on neurosurgical recommendations. Patients with mildly impaired GCS despite positive CT findings may be appropriate for local clinical observation as certain injury patterns have low likelihood of clinical deterioration or requirement for neurosurgical care or surgical intervention.[17-18]

Patients with GCS 9-13 or GCS 14~~-15~~ with risk factors

We recommend that all of these patients undergo a head CT without contrast, and consideration of a non-contrast C-spine CT if clinically indicated. In facilities without CT imaging available, this would require a transfer to a higher care facility. If the head CT imaging is normal, or has abnormal CT findings not usually requiring transfer, we recommend consideration of clinical observation locally. The patient may be discharged with a competent observer and head injury patient education sheet when GCS returns to 15. If there is clinical deterioration, defined as a GCS drop of two or more, or if there is not clinical improvement within twenty-three hours of clinical observation, the patient should undergo prompt repeat head CT and neurosurgical consult.

If the head CT imaging is abnormal, images should be sent via teleradiology for review by a neurosurgeon and neurosurgical consultation should be obtained. These patients may be considered for local admission or transfer based on neurosurgical recommendations.

Patients with GCS 8 or less

These patients status should initially optimized with protection of the airway, avoidance of hypoxia and hypotension, maintenance of normaocarbia, elevation of the head of bed to greater than thirty degrees if possible, and spinal motion restriction. These patients should then be transferred to a Trauma Center with neurosurgical capabilities. A non-contrast CT of the head and c-spine should be obtained if this does not delay transfer. If images are obtained, these should be sent via teleradiology and a neurosurgical consult obtained promptly. If CT imaging is not available, these patients should be transferred to a Trauma Center with neurosurgical capabilities. These severely injured patients do not require primary transfer to a regional facility in order to obtain a CT scan.-Maintain spinal motion restriction.

PATIENTS ON ANTI-COAGULANTS AND/OR ANTI-PLATELET THERAPY

We suggest an alternative algorithm for patients with GCS 14 or 15 who are on anti-coagulants or anti-platelet therapy. Any reversal of anticoagulation should be based on physician discretion after careful consideration of the medical risks and benefits. The complexities and nuances of the patient disease process, psychosocial factors, and disposition should be factored into the decision. Consultation with providers involved with the patient's anticoagulation and care of the injury (i.e. prescribing provider, cardiology or neurosurgery) is appropriate.

Patients on anti-coagulants and/or anti-platelet therapy with a GCS 15

We recommend that all of these patients undergo a head CT without contrast, and consideration of a non-contrast C-spine CT if clinically indicated. In facilities without CT imaging available, this would require a transfer to a higher care facility. For patients on warfarin therapy, an INR level should be checked.

If the head CT imaging is normal, they may be discharged with a competent observer and a head injury patient education sheet (Figure 3).[19-21] Clinical observation at the local facility for 12 hours may be considered; however, these guidelines defer to locally developed protocols. The patient should be counseled that they are at increased risk of a delayed bleed and should be given warning signs requiring repeat medical evaluation.

If head CT imaging is abnormal, images should be sent via teleradiology for review by a neurosurgeon. A prompt neurosurgical consultation should be obtained. These patients may be considered for local admission or transfer based on neurosurgical recommendations. In addition, consideration of reversal or administration of blood products or clotting factors should be made in consultation with neurosurgery.

Patients on anti-coagulants and/or anti-platelet therapy with GCS 14

For patients with a GCS 14 on anticoagulant or anti-platelet therapy a non-contrast CT head should be obtained and consideration of a non-contrast C-spine CT if clinically indicated. In facilities without CT imaging available, this would require a transfer to a higher care facility. For patients on warfarin therapy, and INR level should be checked.

If the head CT imaging is normal and the INR level is < 3, we recommend clinical observation locally for a minimum of 12 hours. If there is clinical deterioration, defined as a GCS drop of two or more, or if the patient does not return to a GCS of 15 within twenty-three hours of observation, the patient should undergo prompt repeat head CT. A patient may be discharged with a competent observer and head injury patient education sheet when GCS returns to 15. The patient should be counseled that they are at increased risk of a delayed bleed and should be given warning signs requiring repeat medical evaluation.

If head CT imaging is normal, but the INR level is ≥ 3, we recommend clinical observation locally with a repeat head CT in 23 hours or if any clinical deterioration. If there is clinical deterioration, defined as a GCS drop of two or more, or if the patient does not return to a GCS of 15 within 23 hours of observation, the patient should undergo a prompt repeat head CT. A patient may be discharged with a competent observer and head injury patient education sheet when GCS returns to 15. The patient should be counseled that they are at increased risk of a delayed bleed and should be given warning signs requiring repeat medical evaluation.

If head CT imaging is abnormal, images should be sent via teleradiology for review by a neurosurgeon. A prompt neurosurgical consultation should be obtained. These patients may be considered for local admission or transfer based on neurosurgical recommendations. In addition,

consideration of reversal or administration of blood products or clotting factors should be made in consultation with neurosurgery.

Patients on anti-coagulants and/or anti-platelet therapy with GCS13 or less

For patients with GCS ≤ 13, the previous guidelines may be followed with the additional consideration of reversal of coagulopathy. Reversal of anticoagulation should be based on physician discretion after careful consideration of medical risks and benefits. The complexities and nuances of the patient's disease process, psychosocial factors, and disposition may factor into this decision which should be made with neurosurgical consultation and if appropriate cardiology input.

Special consideration for patients on anticoagulants and/or antiplatelet therapy in remote settings

In facilities without CT imaging available, poor weather or lack of air- transport may significantly delay transfer to a CT-capable facility. In such cases, the medical provider must carefully observe the patient for development of neurological symptoms on the day of the injury, and subsequent 23 hours post-injury. If the GCS is 15 with a normal CT scan and therapeutic INR <3, it is reasonable to consider discharge. The patient should be given a head injury sheet and be discharged with a competent observer. Patients with a GCS 9-14 with normal INR, or INR > 3 should be observed for 24 hours. Discontinuing anticoagulant therapy during the period of uncertain weather or air transport issues should be discussed with the patient's prescribing physician. If the patient is on warfarin with an INR> 3, or if the patient-centered decision making has dictated a continuation of anticoagulant therapy during the observation period, then transfer to a facility with CT imaging is recommended once the weather clears, or air-transport becomes available. Delayed transfer to a facility with CT imaging for those patients whose anticoagulants are stopped and who do not show signs or symptoms of neurological deterioration should be based on careful patient-centered decision making, taking into consideration the patients age, comorbid conditions, mechanism of injury, and the patients understanding of increased risk for delay in diagnosis of intracranial bleeding if the decision is not to proceed with CT imaging in/around the time of injury. The risks of aeromedical transfer also need to be a consideration in any decision for patient transfer.

NON-SALVAGEABLE HEAD INJURIES

There are patients with severe head injuries who have sustained injuries thought to be non-survivable. These patients should initially be medically optimized with protection of the airway, avoidance of hypoxia and hypotension, elevation of the head of bed to greater than thirty degrees if possible, and spinal motion restriction,. We recommend that these patients undergo CT scan imaging and a prompt neurosurgical teleradiology consult. In some circumstances, it is a reasonable decision not to transport these patients to a facility with neurosurgical capabilities. However, this decision should be made with the input from neurosurgery. Organ donation/transplant services should be contacted for these patients and it is appropriate to transport of patients with no salvageable injuries who are potential organ donors.

EMERGENCY CRANIOTOMY

In severely injured patients, medical optimization is paramount and includes protection of the airway, avoidance of hypoxia and hypotension, elevating the head of bed to greater than thirty degrees if possible, and spinal motion restriction. In patients with rapidly deteriorating clinical exam and evidence of lateralizing pupil exam, emergency surgical decompression by a non-neurosurgeon may be life-saving. This decision should only be made in consultation with a neurosurgeon. Decompressive craniotomy or burr holes should be a consideration only if there is CT imaging consistent with an epidural or subdural hematoma, the patient is rapidly deteriorating, and a facility with a neurosurgeon is more than two hours away, either due to distance or delay in transportation. Most importantly, there needs to be a physician capable of doing the procedure along with the necessary equipment.

CONCLUSIONS

Outlined here is an approach to the evaluation of head injured patients in Alaska, including facilities that do not have a neurosurgeon or CT imaging available. It is an attempt to combine a reading of the current literature with the realities of medical practice and resource availability in our state. It is not meant to replace clinical judgment. There are limits to the applicability of these guidelines including complex social considerations, patients under the influence of drugs or alcohol and remote medical treatment facilities with minimal staff. Additionally, recommendations for pediatric patients under 18 year old are covered separately by the Alaska Pediatric Head Injury Guidelines.

Our state is unique in the factors that may play into obtaining CT scans or neurosurgical consults, especially the frequent need for aeromedical transport and delays in care. Our hope is that this will offer some guidance to clinicians faced with caring for the head injured patient in a very challenging environment. In addition, it will help us to utilize our transport and subspecialty resources in a safe, responsible, and efficient manner.

Figure 1: Glasgow Coma Scale

Eye(s) Opening

Spontaneous	4
To speech	3
To pain	2
No response	1

Verbal Response

Oriented to time, place, person	5
Confused/disoriented	4
Inappropriate words	3
Incomprehensible sounds	2
No response	1

Best Motor Response

Obeys commands	6
Moves to localized pain	5
Flexion withdraws from pain	4
Abnormal flexion	3
Abnormal extension	2
No response	1

Figure 2: Canadian Imaging Criteria

A) Canadian CT Head Rule:

A non-contrast head CT should be considered in head trauma patients with no LOC or post-traumatic amnesia if there is any of the following factors present:

- Suspected open or depressed skull fracture
- Signs of basilar skull fracture (hemotympanum, raccoon eyes, Battle's sign, oto-/rhinorrhea)
- 2 or more episodes of vomiting
- Age ≥ 65
- Failure to reach GCS 15 within 2 hours of injury
- Retrograde amnesia to the event ≥30 minutes
- Dangerous mechanism of injury (pedestrian struck, ejected from MVC, fall from > 3 feet)

**These criteria exclude age < 16, use of blood thinners, or patients with seizure after injury.

B) Canadian C-Spine Rule:

These guidelines apply to trauma patients who are alert (GCS 15) and in stable condition.

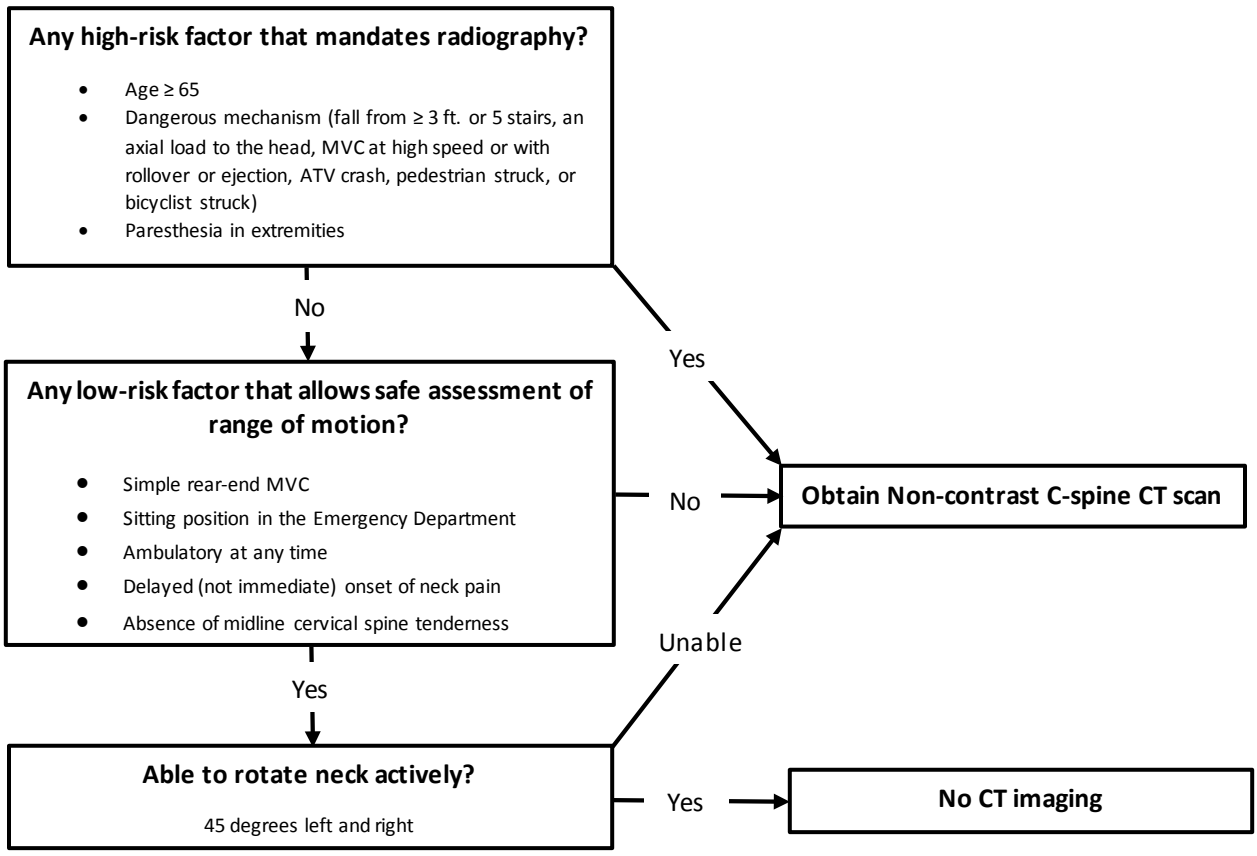

Figure 3: Patient Education Sheet for Traumatic Brain Injury

Facts about Concussion and Brain Injury

About Concussion

A concussion is a type of traumatic brain injury (TBI) caused by a bump, blow, or jolt to the head. Concussions can also occur from a fall or a blow to the body that causes the head and brain to move quickly back and forth. Doctors may describe a concussion as a "mild" brain injury because concussions are usually not life-threatening. Even so, their effects can be serious.

Concussion Signs and Symptoms

Most people with a concussion recover quickly and fully. But for some people, symptoms can last for days, weeks, or longer. In general, recovery may be slower among older adults, young children, and teens. Those who have had a concussion in the past are also at risk of having another one and may find that it takes longer to recover if they have another concussion. Symptoms of concussion usually fall into four categories:

Thinking/Remembering	Difficulty thinking clearly	Feeling slowed down	Difficulty concentrating	Difficulty remembering new information
Physical	Headache	Nausea or vomiting (early on)	Sensitivity to noise or light	Feeling tired, having no energy
	Fuzzy or blurry vision	Dizziness	Balance problems	
Emotional/Mood	Irritability	Sadness	More emotional	Nervousness or anxiety
Sleep	Sleeping more than usual	Sleep less than usual	Trouble falling asleep	

Getting Better

Rest is very important after a concussion because it helps the brain to heal. Ignoring your symptoms and trying to "tough it out" often makes symptoms worse. Be patient because healing takes time. Only when your symptoms have reduced significantly, in consultation with your doctor, should you slowly and gradually return to your daily activities, such as work or school. If your symptoms come back or you get new symptoms as you become more active, this is a sign that you are pushing yourself too hard. Stop these activities and take more time to rest and recover. As the days go by, you can expect to gradually feel better.

Tips to help you get better:

- Get plenty of sleep at night, and rest during the day.
- Avoid activities that are physically demanding (e.g., sports, heavy housecleaning, working-out) or require a lot of concentration (e.g., sustained computer use, video games).
- Ask your doctor when you can safely drive a car, ride a bike, or operate heavy equipment.
- Do not drink alcohol. Alcohol and other drugs may slow your recovery and put you at risk of further injury.

There are many people who can help you and your family as you recover from a concussion. You do not have to do it alone. Keep talking with your doctor, family members, and loved ones about how you are feeling, both physically and emotionally. If you do not think you are getting better, tell your doctor.

For more information and resources, please visit CDC on the Web at: www.cdc.gov/Concussion.

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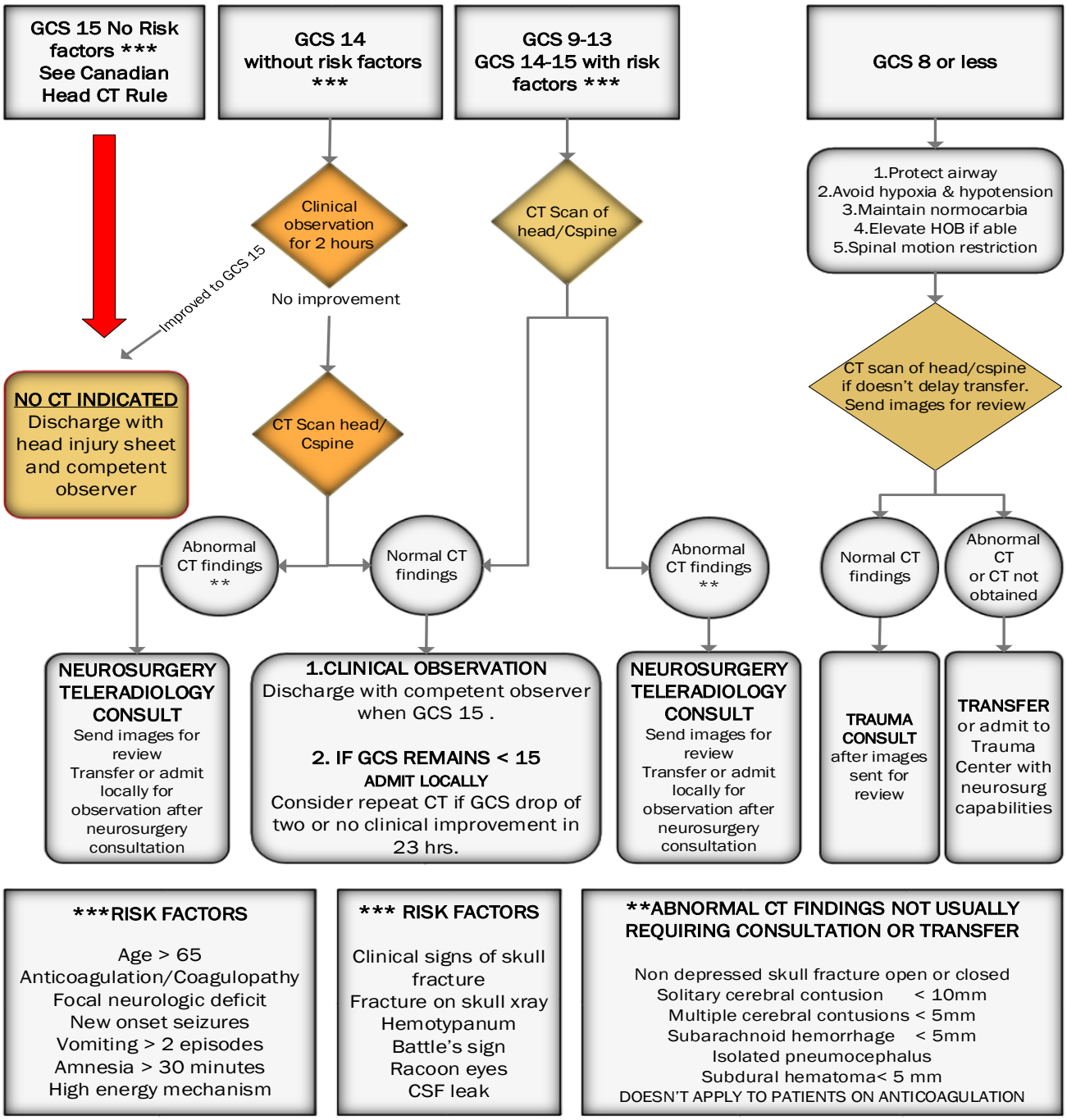
ALASKA ADULT BLUNT HEAD TRAUMA GUIDELINES
(18 years and older)



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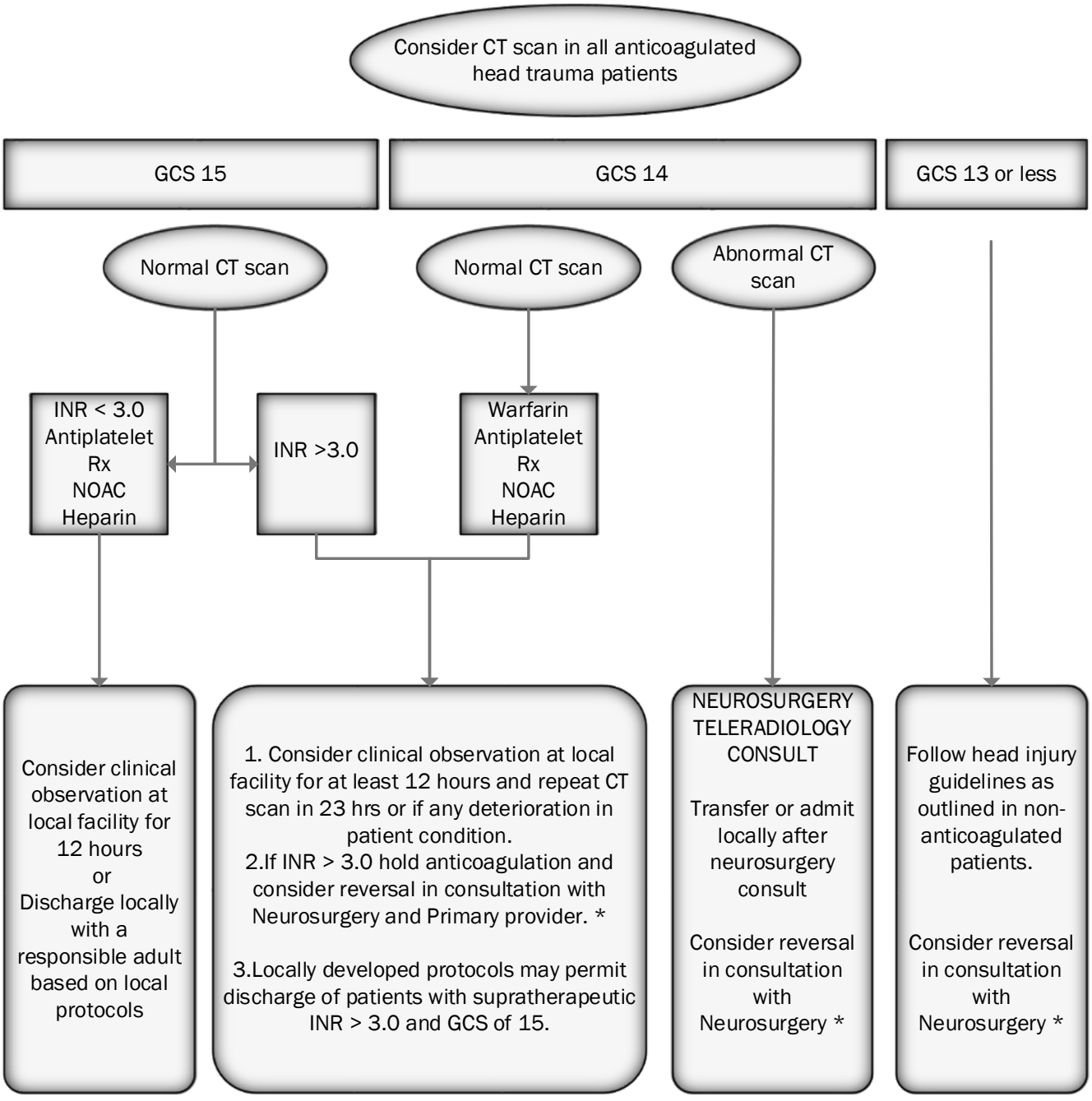
ANTICOAGULATED PATIENTS WITH HEAD TRAUMA (including ground level falls excludes patients on aspirin)



SEND IMAGES FOR REVIEW IF NEUROSURGERY TELERADIOLOGY CONSULT DESIRED

* See attachment for recommendations on reversal of anticoagulation.

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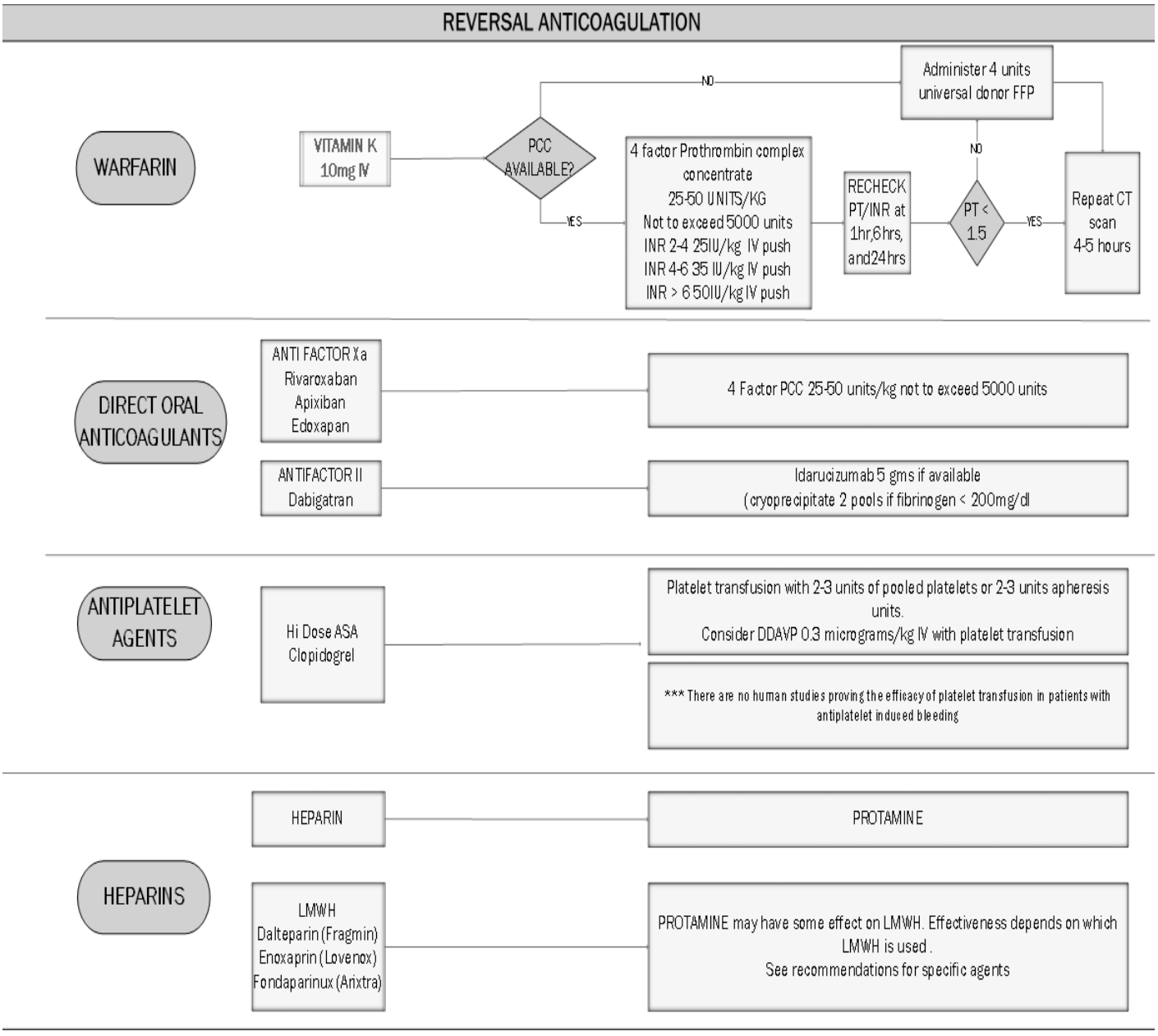
REVERSAL ANTICOAGULATION ON ACUTE BLUNT HEAD TRAUMA PATIENTS

(Including ground level falls, excluding patients on aspirin)



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